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09/739,002	12/19/2000	Ruey-Yuan Han	017750-380	2799

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EXAMINER	
KIM, CHONG R	

ART UNIT	PAPER NUMBER
2623	4

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/739,002	HAN, RUEY-YUAN	
	Examiner	Art Unit	
	Charles Kim	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 8-11* is/are rejected.

7)☒ Claim(s) *2-7,12 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

The following quotation of 37 CFR § 1.75(d)(1) is the basis of objection:

> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. (See § 1.58(a)).

1. Claims 9-13 are objected to under 37 CFR § 1.75 (d)(1) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery.

Referring to claim 9, the phrase "the 2-dimension sinc function" in line 5 lacks antecedent basis. It appears that the applicant intended the phrase to read "a 2-dimension sinc function". Appropriate correction is required. A similar objection is also applicable to claim 11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Zhu, U.S. Patent No. 6,625,216 ("Zhu") and Sims et al., U.S. Patent No. 5,524,845 ("Sims").

Referring to claim 1, Zhu discloses a method for tracking an object in an image using transforms, comprising the steps of:

a. identifying a background correction term for a frequency (Hadamard) transform correlation tracker [col. 3, lines 21-63 and col. 4, lines 38-41. The Examiner notes that a background correction term is an inherent feature in the expansion of the minimum MSE criterion (equation 1), wherein expanding the equation squares the terms inside the bracket]

b. tracking the object based on a representation of the background correction term that includes the frequency domain sinc function [col. 4, lines 38-64. Zhu explains that the motion blocks and trial matching blocks are transformed into the frequency domain, and the resulting transformed blocks are correlated using the MSE matching criterion. The Examiner notes that transforming the blocks into the frequency domain will result in a frequency domain sinc function, since the frequency domain representation of a spatial block (rectangle) is a sinc function. The Examiner further notes that the frequency transform of the background correction term (noted above) is represented by a frequency domain sinc function].

Zhu further discloses a Hadamard frequency transform correlation tracker, but fails to explicitly disclose a Fast Fourier Transform correlation tracker. However, Zhu explains that "any frequency/sequence domain transform or other orthogonal transform in which signal energy is compressed into a relatively small number of components" can be utilized (col. 4, line 64-col. 5, line 3). The Examiner notes that Fast Fourier transforms were exceedingly well known types of transforms used to compress signal energy into a relatively small number of components, and commonly utilized in object tracking systems. For example, Sims discloses a Fast Fourier Transform correlation tracker for tracking an object in an image (col. 1, line 57-col. 2, line1).

Zhu and Sims are both concerned with tracking an object in an image. Zhu is concerned with a fast frequency transform algorithm that is simple to implement (Zhu, col. 4, lines 58-60). Sims provides a frequency transform (FFT) that is fast and simple, and allows real-time tracking capability (Sims, col. 1, lines 46-56). Therefore, it would have been obvious to modify the correlation tracker of Zhu so that it is a Fast Fourier Transform correlation tracker as taught by Sims, in order to enhance the processing speed of the tracking system by utilizing a fast and effective frequency transform algorithm.

Referring to claim 8, see the rejection of at least claim 1 above. Zhu discloses a method for tracking an object in an image using frequency transforms, comprising the steps of:

i. transforming non-constant terms of a mean-square-error (MSE) function from the spatial domain into the frequency domain (col. 4, lines 38-41), wherein one of the non-constant terms is a background correction term and the frequency domain representation of the background correction term includes the 2-dimension sinc function (see the discussion of claim 1 above)

ii. computing the non-constant terms in the frequency domain (col. 6, lines 26-30).

Zhu fails to disclose the step of transforming the computed non-constant terms from the frequency domain to the spatial domain to obtain a correlation surface. However, this feature was exceedingly well known in the art. For example, Sims discloses a step of transforming computed terms from the frequency domain to the spatial domain to obtain a correlation surface (col. 2, lines 1-3). The Examiner notes that the correlation surface taught by the combination of Zhu and Sims will have a minimum that corresponds to the location of the object in the image;

since Zhu explains that the matching criteria is met when the MSE is minimized (col. 3, lines 41-43 and equation 2).

Zhu and Sims are both concerned with tracking an object in an image. Zhu is concerned with increasing the accuracy of the object tracking system (Zhu, col. 1, lines 50-52). Sims's method increases the accuracy of the object tracking process (Sims, col. 2, lines 40-43). Therefore, it would have been obvious to combine the teachings of Zhu and Sims, in order to increase the accuracy of the object tracking system.

Referring to claim 9, see the rejection of at least claims 1 and 8 above. Zhu discloses a method for tracking an object in an image using the first and third terms of a mean square-error function C(s,t) [MSE(d1,d2)] defined as having three terms, wherein the first term is a background correction term [col. 3, lines 41-63. The Examiner notes that expanding the minimum MSE criterion (equation 1) by squaring the terms inside the bracket will result in three terms, wherein the first term is a background correction term, as noted above], the method comprising the steps of:

a. transforming the first and third terms into the frequency domain (col. 4, lines 38-41)

b. computing the first term in real-time using a 2-dimension sinc function (see the discussion of claim 1 above)

c. computing the third term (col. 4, lines 38-41).

Zhu fails to disclose the step of transforming the computed first and third term out of the frequency domain to form a correlation surface. Sims teaches this feature as noted above (claim

8). Therefore, it would have been obvious to combine the teachings of Zhu and Sims, for the reasons stated above.

Referring to claim 10, Zhu further discloses that the mean-square-error function C(s,t) [MSE(d1,d2)] is defined as:

$$C(s,t) = \frac{1}{N}\sum_{N} f^2(x,y) + \frac{1}{N}\sum_{N} g^2(x-s,y-t) - 2*\frac{1}{N}\sum_{N}[f(x,y)*g(x-s,y-t)]$$

Zhu discloses the MSE function in col. 3, lines 47-54, more specifically equation 1. The Examiner notes that expanding the minimum MSE criterion (equation 1) by squaring the terms inside the bracket will result in an equation having the form above.

Referring to claim 11, see the rejection of at least claim 1 above. Zhu discloses a frequency transform correlation tracker, comprising a computing device with inputs for receiving an input search window (current frame) and receiving a reference window image (motion block), wherein the computing device tracks the reference window in the input search window based on a frequency domain background correction term that includes a 2 dimension sinc function (col. 3, lines 21-40 and the discussion of claim 1 above).

Allowable Subject Matter

3. Claims 2-7, 12-13 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Atashroo U.S. Patent No. 5,703,970 discloses a method for correlation images using FFT algorithms.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

ck
October 15, 2003

Jon Chang
Primary Examiner